SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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BEFORE A NEW ALTAR

Supplication at a Twentieth-Century Shrine of Mercury

(See page 314)

Vol. XVI No. 480

New Robot a Tireless Counter

Physics—Biology

Much of the wearisome, routine, midnight-oil work that now besets biologists and other scientists will be taken off their hands by a new electrical robot described at the meeting of the National Academy of Sciences. The device is the invention of A. L. Loomis, banker-scientist of Tuxedo Park, N. Y., and has been given its first extensive workout by Prof. E. N. Harvey of Princeton University.

The mechanism is intended for the recording of natural rhythms, such as breathing, the beating of a heart, or the rapid impulses along a nerve trunk. It is geared in such a way that ten successive beats are recorded by a straight line drawn by a pen, the length of the line indicating the time of the action. Then the pen goes back to the zero line and starts recording another ten beats, on a line parallel with the first. The instrument will keep this up for hours or days on end, so long as ink, recording paper, and the pulsating animal or organ hold out. In the meantime the scientist who used to have to sit and watch his experiment through many weary hours can lecture to his classes, or play golf, or go home to bed.

Prof. Harvey has made use of the new chronograph in three series of experiments, one on a rhythmically flashing neon lamp, another with human subjects tapping a telegraph key, and the third and most extensive with the isolated heart of a turtle. The flashing of the lamp, a purely physical process, did not vary one per cent. during four hours. The infinitely more complicated and variable human mechanism, as was expected, showed fluctuations of as much as 20 to 30 per cent. in 15 minutes.

The turtle's heart was selected because it keeps on beating indefinitely after the animal has been killed and it has been taken out of the body. Kept at a constant temperature in a physiological solution, it continued to beat, in one of the experiments, for 36 hours.

It was learned that individual hearts show wide individual variations. One slowed 60 per cent. during a 12-hour period, while another varied less than two per cent. over nearly five hours, and less than one per cent. over half-hour periods.

There are commonly periodic changes in rhythm superposed on the heartbeat. A heart may show a six per cent. decrease in rate, lasting three minutes, every twenty minutes for four such periods, or similar three to four per cent. increases in rate lasting a few minutes for three 15-minute periods.

After learning something of the performance of the "normal" isolated heart, the effect of drugs can be studied. When adrenalin is added to the solution containing a heart it accelerates the action of the muscles and at the same time makes them operate more regularly. The 36-hour record for one of these hearts was obtained by means of adrenalin.

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Giant Jewels Found

Geology

Enormous crystals of beryl, 12 to 14 feet long and two or three feet in diameter, have lately been discovered near Albany, Maine, Prof. W. B. Scott of Princeton University reported to the National Academy of Sciences. Beryl is usually rated as a semi-precious stone, and crystals of this size are simply monumental. Prof. Scott wishes to find some way by which this group can be saved from destruction and permanently preserved as it now stands.

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In This Issue

Indian-Eskimo Kinship

Anthropology

Promise that the puzzling question of the relationship, if any, between Eskimo and Indian may at last move toward solution was held out by Dr. Ales Hrdlicka of the U. S. National Museum, speaking before the meeting of the National Academy of Sciences.

On this season's expedition into Alaska, from which he has just returned, Dr. Hrdlicka sought out a group of Eskimos along the Yukon river, who had never before been measured for scientific purposes. About 200 full-blood Indians and Eskimos were measured, and in Dr. Hrdlicka's phrase, "there is a growing warmth for the hope that before long it may be possible to say something definite about the origin of the Eskimo and his relation to the Indian."

The expedition also did much toward establishing the ancient migration route of the first human beings to people this continent. One highly significant discovery by Dr. Hrdlicka was that of a type of burial known before only from the east cape of Asia. The oldest human remains ever discovered in Alaska were found; but nothing was of geological antiquity. It does not seem likely that such remains ever will be found in this region, because of the great changes the river has wrought in its shores and delta.

Science News-Letter, November 23, 1929

A Pilgrim Worships

Entomology

The most striking, even dramatic, nature photographs are usually posed quite unconsciously. A short time ago, during the autumn migration of praying mantises that usually follows the first chill weather, one of these strange insects blundered through the open window of the Bell Telephone Laboratory in New York City and alighted on the base of one of the new dial telephones. It rested there, in its spectral pose, long enough for one of the studio photographers to set up his camera and "shoot" the picture reproduced on the cover of this issue of the SCIENCE NEWS-LETTER.

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Do You Count Fence Posts?

Psychology

By Emily C. Davis

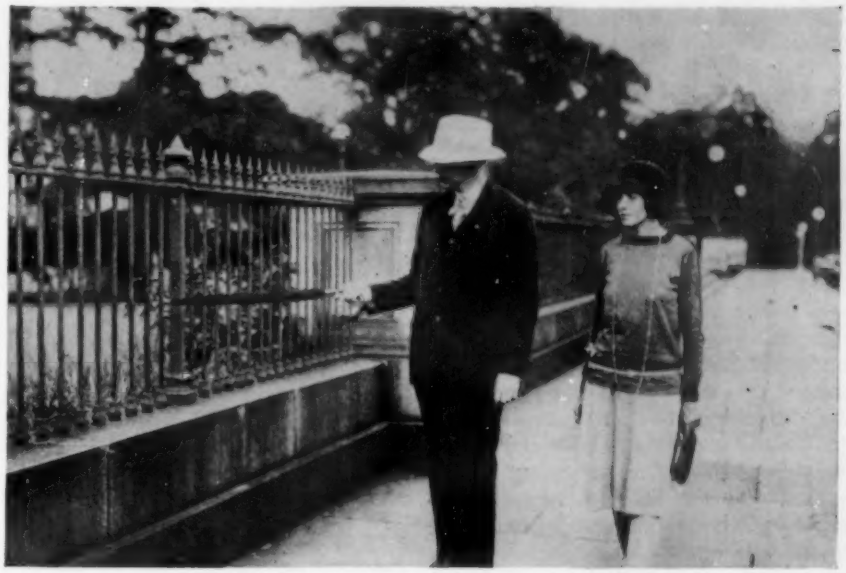
Do you count fence posts as you walk along the street? Can you report precisely how many steps you take when you walk home from work? Do you find yourself counting the cars of a passing freight train, or the automobiles that whiz by as you drive down the road? Or perhaps you occasionally engage in the game of Beaver—counting all the whiskered gentlemen you can find?

If you do any of these mental arithmetic stunts, you are using your brain in a manner that is highly popular with the human race—much more popular than has heretofore been supposed, for up until now nobody has taken the time to count the people who have the counting habit.

A psychologist who apparently likes counting things himself has at last gathered statistics on the number of students at his university who have what he calls "arithmo-thymic inclinations". His discovery is that more than half of the young people count one thing or another. It may be books on library shelves, motifs in wallpaper patterns, buttons on clothing, funeral equipages, steps from one landing to another in university buildings, letters in the words on signboards, houses on each block in the town. A complete list of the objects in the world that are found suitable for such counting would be long and varied.

The students who were questioned are at the far-away university of Poznan, in Poland. But it is safe to say that their mental habits are fairly typical of human beings anywhere, and not merely college-age humans either. The Polish professor, Stefan Blachowski, first presented his discovery, that counting objects is a prevalent occupation, at the International Congress of Psychology held recently at Yale. His address provoked lively discussion among his fellow-psychologists. And wherever the Polish professor's experiments entered into a conversation, a surprising number of Americans remarked: "Why, I count that way, too."

Women are more inclined to the counting habit than men, Prof. Blachowski explained. Among 96 college students evenly divided as to sex, he found that 67 per cent. of the women had the habit as compared with only 44 per cent. of the men. He made a retest, using 71 new students, and again women were the chief counters.



COUNTING FENCE PALINGS is an ordinary mental amusement of normal people

This slant on the feminine mind is unexpected, considering the popular belief that women are inclined to shy from figures. If we look into the matter more closely, however, we can see that the popular belief is not necessarily discredited. For being addicted to arithmo-thymia is very different from having a mathematical turn of mind. The individual who counts the people opposite in a face-to-face street car is not really juggling with any principle of arithmetic beyond the first lesson in first-grade addition. The mental effort of adding one to twenty-three is not to be compared with the mental effort of making a bank account balance.

The psychologist's figures show that some of the students count only one sort of object. Others are more liberal in their interest. One student made a remark which the psychologist regards as typical:

"If I see something in a row, pictures upon the wall, for instance, I count them."

Another student said: "I always count the stations during railway journeys. Perhaps I do so because I always describe my journey in detail. I count the houses and jot down my precise observations in my diary."

The experiences of the students show that the counting habit occurs with very different degrees of distinctness and force among normal people. If you are an arithmo-thymic, it may only mean that once in a while you idly set yourself some such task as counting the number of brown coats on the street, because it pops into your mind that an extraordinary number of brown-clad people are in sight. Or, you may count steps as you walk, because your sense of precision pesters you to find out how many steps you have to take to reach a given point, or because, like Sherlock Holmes, you believe in close attention to details of this sort. You may remember that he advised his friend Watson to ascertain the number of steps in their lodging house.

The author Swift amused himself in this fashion, and in his "Diary to Stella," written in 1711, he states:

"I leave my best gown and periwig at Mrs. Vanhomrigh's, then walk up the Pall Mall, through the Park, out at Buckingham House, and so to Chelsea, a little beyond the Church: I set out about sunset, and get there in something less than an hour; it is two good miles, and just five thousand seven hundred and forty-eight steps."

But suppose you become so accustomed to counting steps that it is a regular part of your daily routine. You omit the counting process one morning, and an unpleasant sense of incompleteness lurks in the back of your head. In the course of the day's work an order is balled up, and your brain switchboard flashes instantly a connection between the office difficulties and the failure to start the day according to custom. Superstition, luck, fear—when these insidiously link themselves with the counting habit, the inclination to count (*Turn to next page*)

Do You Count Fence Posts?—*Continued*

may soon shade over into a compulsion.

Even then, the individual may still be captain of his fate. That is, his counting impulse may not interfere with his daily life any more than a superstitious belief that events may be expected to go in series of threes, for good or evil.

But if a counting compulsion is so powerful that an individual does not dare to act contrary to it, then he is a victim of paralyzed will, and he is eligible for the doubtfully desirable title of being an arithmo-manic.

In the past, psychologists have thought of the counting habit as being abnormal, because many patients suffering from mental disease are slaves to a mania for counting. Patients with this compulsion to count long ago attracted the interest of science, because their symptoms were pronounced and therefore conspicuous. Prof. Blachowski pointed out that here, as in other domains, science at first occupies itself with extreme cases, and for a long time it escaped observation that arithmo-mania is merely an abnormal variation of the common impulse to count.

Thirty years ago, a French scientist, Ginestoux, reported to a society of anatomists and physiologists the strange case of a young man who counted every letter in every phrase that came to his attention. This young man counted the letters in each sentence that he spoke, read, heard, wrote or thought. He had to, he explained. The counting began when he awoke in the morning and was kept up until he fell asleep at night. If any sentence was spoken to him, he could immediately announce the number of letters it contained.

He had been at this incessant mental occupation since the age of ten, but he told the scientist who investigated his case that he found his habit no great burden. It did not prevent him from holding a conversation, reading a book, nor from making a living at a profession. He was a placid and intelligent young man, in spite of his arithmo-mania, and that is the really remarkable part of his case. For most individuals who become saddled with the counting habit to the extent of incessant counting are no longer useful or contented members of society.

Needless to say, an individual is not likely to succumb to a counting mania unless his mental health is in a precarious state from other causes. When Prof. Blachowski's report was discussed at the International Congress

STEPPING OVER THE LINES in the pavement is one of those odd stunts akin to counting things

of Psychology, Dr. Leonard Seif, of Munich, arose to suggest that mental patients who cannot resist counting are using this device in order to escape from the responsibilities of life. The neurotic wishes to escape from the tasks that face him. His relations with other people have become disturbed in some way, and so when he has to face responsibility or a task, he does something else, usually something useless, such as counting, in order to evade his duty.

"One of these cases," the German psychiatrist explained, "is a lady who wants to be a magician, though this workaday planet is not arranged for magicians. She has a magic number thirteen, and it is a wonderful number. It makes life work pleasantly for her. One day she fails in what she wishes to do and the day is the thirteenth. Then she has to avoid everything connected with the thirteenth. It is no longer lucky, but unlucky."

Such a person has shifted the responsibility of making decisions away from herself and placed the responsibility squarely on the turn of magic numbers. If she happened to count thirteen children playing in a school yard, her apprehensions would be aroused. Something unpleasant would happen. If she then met a friend at the turn of the corner, her distorted imagination would probably suggest that the friend wished to do her evil and that she had been forewarned. And so the entire life of such a person becomes a maze of ritual counting and fears and expectations.

Applying Dr. Seif's theory of why abnormal people count, to normal people, it appears that the average person who engages in arithmo-thymia is thereby filling up the mental vacuum which his brain would abhor by inserting thoughts that are painless and effortless. If he is counting fence posts he is not bothered by the letters he ought to write, nor the rent bill, nor the embarrassing remark he made that morning. Nor, on the other hand, is he solving any of the problems of his universe.

Perhaps when Prof. Blachowski goes deeper into the subject of arithmo-thymia, as he has promised to do, he will gather statistics on how much time the average arithmo-thymic spends at his avocation, and whether this should be cultivated as beneficial relaxation or condemned as inocuous desuetude.

There are many forms of habits closely allied to the counting impulse which are also waiting for statistical studies and a complete explanation from sicence. The learned Dr. Samuel Johnson tapped with his cane against fence railings in Fleet Street as he walked along, and if he missed one, he turned back to touch it. He also had the habit of counting his footsteps so that he might go out of a door with the same foot first.

Children take notions that they must not step on the cracks in the sidewalk, or else they must step on every single crack. A. A. Milne delightfully shows the motive back of this game in one of his poems about Christopher Robin. Christopher imagines that masses of bears wait at the corners to eat the sillies who tread on the lines, and he concludes:

"It's ever so 'portant how you walk,
And it's ever so jolly to call out,
'Bears,
Just watch me walking in all the squares!'"

When another child than Christopher Robin steps over cracks, the object may not be to avoid imaginary bears, but there is the same victorious feeling of escaping something.

Throughout all these mental stunts and habits there runs a thread of the deep-rooted human affinity for magic and superstition. Also, there is a feeling of satisfaction which rises from acting in a precise or rhythmical way. These desires, apparently, are not satsified by our daily work and amusements, and so 54 per cent. of us—in America, no doubt, as in Poland—engage in arithmo-thymia.

CLASSIC INVENTIONS: Reuleaux on Machine Design

Mechanics

This section from a classic work on the theory of machines is offered in the hope that it may furnish suggestions of value to the amateur inventor, and may give others a new slant on the machine age in which we find ourselves.

THE KINEMATICS OF MACHINERY. Outlines of a Theory of Machines. By F. Reuleaux, translated and edited by Alex. B. W. Kennedy, C. E. London: 1876.

Growth of Modern Machinery

Modern machinery came into existence with the invention of the Steam Engine, and with it and by it has developed itself with a rapidity not even approached in former times. This has not been, in my opinion, by any sudden leap, by any discontinuousness in the sequence of ideas; it is due rather to an acceleration in the rate at which one has followed the other. The curve has risen suddenly, without any change occurring in the law according to which it is formed. We must here not forget how difficult it is in all cases to form an opinion about matters occurring in our own time, for we ourselves are subject to the influence of the time, and must judge it while we form part of it. The immense number of cases existing, on the other hand, and the exactness of our knowledge of them, here help us very greatly. An examination of the way in which the gradual perfecting of machines is today going on teaches us, however, one thing—as we shall presently see—namely, that the process of the replacement of force-closure by pair- and chain-closure goes on quietly extending itself further and further to this hour. We may therefore consider this process as showing the essential general tendency of the whole machine-development up to our time—we may even go further, and say that we must consider it as an essential characteristic of future machine-development.

In Newcomen's steam-engine, force-closure still predominated, and it remained thus through the whole eighteenth century. The machine was force-closed in its pit-work, in its beam-chains, in its steam-piston and in its valve-gear—although in the latter Potter's invention had substituted a machinal arrangement for the hand-gear. Watt introduced pair- and chain-closure by degrees into the machine. Thus, for instance, the force-closed beam-chains became the imperfect but still kinematically far more complete "parallel motion". Even to our own time the venerable pumping machinery used in our mines remains partly in the fetters of force-closure; it is only very lately that direct-acting steam pumping engines have begun to dispute its position. . . .

NEWCOMEN'S STEAM ENGINE, the crude, force-closed machine which was the fore-runner of the much more efficient power-plants of today

Traction Engines

In our various means of transport the change from force- to pair-closure has continued to the present time. After all had been done in improving the construction of the vehicle itself, furnishing it with a suitable fore-carriage, making better roads for it to move upon, etc., force-closure still remained, if nowhere else at least in the preservation of the direction of motion, which still demanded accustomed animals and an intelligent driver. Men naturally attempted to replace this force-closure by pair-closure. In the Railway the rails are paired with the wheels—force-closure is used only to neutralize vertical disturbing forces. The step thus made in the direction of machinal completeness—which it required half a century to make[1]— was a most important one—it was in reality no other than the uniting of the carriage and the road into a machine. The rail forms a part of this machine, it is the fixed element of the kinematic chain of which the mechanism really consists. The further improvement of the pair-closure, the removal of any remaining disturbing force-closure whether in the rails, in the axle-boxes, in the arrangement of the springs of carriages and of locomotives and so on, still engages most careful attention. In opposition to this we have the problem of steam locomotion on common roads, which has been so feverishly taken up again within the last few years, but the solutions of which seem doomed to eternal incompleteness, for they are self-contradictory. It is desired to make something which shall be a machine, but in which at the same time the special characteristic of the machine — the pairing of elements—may be disregarded. On the other hand, attempts have been made—as in Boydell's Traction Engine—to carry with the machine at least a portion of a transportable element which could be paired with the wheel, all indicating the general tendency towards the limitation of force-closure. Thomson's India-rubber tyres have essentially the same object—the inner side of the ring of vulcanized India-rubber, externally flattened upon the road, serves as a smooth uniform surface for the rigid tread to run upon—thus corresponding generally to the rail of the railway.[2]

The development of the Turbine has followed the same course—it has grown out of the primitive wheel of the Tyrolese and Swiss mountaineers in the hands of the mechanicians of our century. In the latter the water dashed and eddied against its irregular blades in vehement force-closure—in the Turbine it is already combined into a pair of elements with the accurately shaped wheel with very considerable completeness. . . .

Toothed wheels furnish us with another example. Although they have been known for thousands of years, their improvement today is still essentially in the direction of excluding force-closure, that especially which has remained with the "clearance" or "freedom" allowed between the surfaces of the teeth, and which has often enough made itself disagreeably felt. In the Chinese winding mill (gin) and in the similar machine used by the Egyptians, and worked by water (the Sakkiah), there is a large amount of play left between the teeth, which were merely such rough blocks as rendered it possible for one wheel to drive the other. But we see that during the Middle Ages, and in the last few centuries, the freedom has been more and more reduced, as greater care has been taken to find (*Turn to next page*)

[1]Wooden rails were in use at pits near Newcastle as early as 1676,—the first iron rails were laid down in 1738.

[2]It was this action unfortunately, the motion of the tread inside the tyre, which caused the failure of many of these engines. The excessive wear which took place in the India-rubber made the cost of repairs enormous.

the kinematic condition to be fulfilled by the form of the teeth-profiles, until we have now succeeded in reducing it to a very small fraction of the pitch. During the last century, the wheel and its teeth gradually came to be understood as forming together one whole, and the teeth-profiles were then looked at in a new light. I believe that in a few decades it will be the rule to employ spur-wheels working without any clearance between the teeth. . . .

Putting in a few words the results of our examination in their relation to the fundamental idea laid down at the beginning of the chapter, we may say that the limitation of force-closure has essentially been the means by which machines have been made capable of better carrying out their own share of work. This limitation led gradually from the make-shift first attempts at machines to the accurately working pairs of elements and the simpler mechanisms. This at the same time creates the possibility, and becomes the cause, of further extension of the limits within which the machine acts—of obtaining larger results by human intellect,—or as we expressed it before, of making the share of the machine a larger fraction of the whole problem.

The endeavors after this lead to the invention of new mechanisms and in these again force-closure—which seems always to be nearest to our hands—is at first employed. This shows itself every day, especially in machines invented by workmen or others whose knowledge of their subject is merely empirical. Of such machines we have many; not infrequently they have been pioneers to open up a new region. They contain such a combination of weights, springs, tappets, catches, stamps, fly-wheels and so on, clattering and jerking in their force-closed working, that they might be a little representation of all the steps in the development of the machine seen through a reversed telescope. The experienced and scientific designer sets them aside with a smile, and replaces them with accurately working elements. But in spite of his experience and knowledge, if the same man have to design an entirely new machine, he too will at first employ force-closure in many places where he might better have used pair-closure, and where in time he will use it. The Corliss valve-gear is a capital example of this; in its earliest form it was everywhere force-closed, and all the subsequent improvements have been unconsciously in the direction of the replacement of this by something better. In the intensive growth of the machine we thus see that the removal of force-closure is also continually going on, by restricting its employment within narrow limits, so distinctly that we cannot wish, nor indeed dare, to attempt to return again to its use.

Systematic Constrainment

We must not overlook the fact that to a certain extent the general development of the machine has hitherto gone on unconsciously, and that this unconsciousness which has characterized the older method of production has left its special mark, it prevents that method indeed from being distinctly understood. The way in which the modern machine is designed is different, lying as it does from the beginning in the hands of experienced and more or less scientific men. Here some things at least, if not a large number, are closely and deliberately grasped. Here we do not so much see the improvement of old and defective arrangements as the bringing into existence of new ones, enabling the machine to perform operations which had previously been considered quite beyond its province. The mechanism, although new, is presented to us complete—a faultlessly constrained and closed system of bodies—ready to be put to practical proof; as we see, for instance, in sewing-machines, in the new guns and projectiles, and so on. There can be no doubt that in some of these there are tokens of a new tendency, a very striking one, very distinctly differing from that which gave us the older machines. The difference somewhat resembles that between the processes of integration and differentiation. Formerly the fundamental idea of alteration or extension was improvement, a word which says much in itself of the nature of the process. Now, on the other hand, we have a direct production of new things, a sudden bringing into being of so far complete machines. We see the beginnings of a perception which will some day apparently be universal among those who have to do with all classes of machinery. Upon this growing sense I believe that our polytechnic machine-instruction should act with increasing certainty. The nature of men's talents meanwhile remains as a whole unaltered. The idea must be developed in each individual afresh microkosmically from its beginning onwards. For this reason, and also because incomplete solutions may still be real solutions, the existing antagonism between pair- and force-closure will never become quite extinct.

The whole inner nature of the machine is, as our investigations have gradually made clear, the result of a systematic restriction; its completeness indicates the increasingly skilful constrainment of motion until all indefiniteness is entirely removed. Mankind has worked for ages in developing this limitation. If we look for a parallel to it elsewhere we may find it in the great problem of human civilization. In this the development of machinery forms indeed but one factor, but its outline is sufficiently distinct to stand out separately before us. Just as the poet contrasts the gentle and lovable Odyssean wanderers with the untamable Cyclops, the "lawless-thoughted monsters", so appears to us the unrestrained power of natural forces, acting and reacting in limitless freedom, bringing forth from the struggle of all against all their inevitable but unknown results, compared with the action of forces in the machine, carefully constrained and guided so as to produce the single result aimed at. Wise restriction creates the State, by it alone can its capacities receive their full development; by restriction in the machine we have gradually become masters of the most tremendous forces, and brought them completely under our control.

Franz Reuleaux (1829-1905) came of a family long distinguished in the engineering profession in Germany. He had practical instruction in shops in his youth, and studied for four years at Karlsruhe, Bonn and Berlin. After some practical experience in Cologne, he began teaching mechanics and technics in Zürich, at the age of 27. Later he taught in technical schools in Berlin and Charlottenburg. He published "Theoretischen Kinematik" at the age of 46. The English translation from which this extract is taken appeared the next year. Reuleaux also served on the juries of nearly all the great international exhibitions of the time.

It is an odd coincidence that this year is the 200th anniversary of the death of Thomas Newcomen, inventor of the first practical steam engine, and the 100th anniversary of the birth of Reuleaux, one of the greatest masters of design of the machines which sprang into being so rapidly after the appearance of the steam engine.

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A radish contains 91 per cent. of water; turnip roots, 89 per cent., and celery 84 per cent., as compared with bread only 35 per cent.

Filtered Whistle May Tell Altitude

Aviation

Difficulties in the construction of apparatus for telling the height of a moving airplane were described by Lieut. Leo P. Delsasso, U. S. Naval Reserve, physicist in the University of California at Los Angeles.

The maintenance of regular schedules by commercial fleets now requires flying in all kinds of thick weather. The ground may be out of sight, but the pilot must know his clearance.

The barometer, time-honored altitude gauge, falls short of satisfaction on at least two counts. In the first place, it measures altitude from sea level, not from the ground, and thus gives scant information in mountainous country. Furthermore, natural air-pressure conditions may change during a single flight so much that the barometer dial setting is thrown off as much as 500 feet, or in exceptional cases 1000 feet or more.

The sound-resonance method of altitude detection, developed in the Navy some years ago by Lieut. Delsasso and others, is regarded as the best prospect. When used in ordinary navigation, the depth of the sea bottom is readily measured from a vessel.

If a loud, sharp sound be emitted downward from a flying airship, its return echo may easily be received and timed with proper chronometric apparatus. From the known speed of sound in air one may calculate the distance to earth. This scheme works fairly well with a lengthy craft such as the Graf Zeppelin, where the delicate sound receiver can be mounted far from the noise of motors. With the airplane, however, the noise of operation is so great that the pilot finds it almost impossible to analyze the echo returning from the earth. He is unable to tell which returning sound is the tell-tale signal.

Research in progress in Lieut. Delsasso's laboratory indicates that a sound filter will solve the difficulty. A very sharp sound—preferably one generated by a whistle—is chosen to give one simple frequency of vibration, but in great amplitude or intensity. Such a selected sound is sent downward from the plane, and its echo received in apparatus adjusted to receive the least possible direct sounds from the nearby motors.

In the receiving apparatus the desired sound is built up by a suitable resonator which does not respond to the miscellaneous motor noises. The extraneous sounds may then be damped considerably without loss of the specific sound which is desired.

The use of such a sound filter and detector would have prevented a disaster like that suffered some time ago near Beaumont, Calif. In this accident the pilot, headed for the Colorado desert, was flying blind in a fog. He missed the San Gorgonio Pass and collided directly with the mountain barrier at one side. With proper sounding equipment he could have measured his distance to the ground below, or to possible obstructions on either side, according to the direction in which he might set his instrument.

Science News-Letter, November 23, 1929

Stock Planes Perform Well

Aviation

By Capt. Thomas Carroll

Capt. Carroll is test pilot for the Daniel Guggenheim Safe Aircraft Competition.

Although the rigorous test routine of the Guggenheim Safe Aircraft Competition demands highly specialized designs, a number of manufacturers have quite intelligently entered stock model airplanes which quite unexpectedly have shown very excellent performance under the rules of the competition.

It is hardly to be expected that many or possibly any of these types will actually meet the full program of qualifying tests, but it is indicative of the high quality of the American design.

Among these types should be mentioned the Command-aire, Bird and the Kitty Hawk. Some of these little airplanes, which incidentally generally fall into the low price class, have all the performance in the way of carrying ability and high speed that could be possibly required of them. That their structures are strong and durable is assured by the Department of Commerce approved type certificate.

In addition, their characteristics in stability and maneuverability, particularly in slow speed flight, are exceptionally good. Due to careful adherence to the best in wing design they do not, when pulled up to speeds bordering on the stall, show a tendency to whip off into a spin or any such other dangerous or uncomfortable condition, but may be maintained in a slow speed condition with very good control throughout.

The competition is sometimes criticized on the grounds that too great stress is placed on this slow-speed requirement. But the tests have as their purpose the discovery of airplanes that can be brought into small fields, should emergency demand, in relative safety, and that under the guidance of an average pilot will not be on the verge of a dangerous stall and spin. The stock types are demonstrating their ability to do this, and they deserve almost as much credit from the practical aviation viewpoint as will the probable winning types, with intricate gear and expensive modification.

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An aircraft camera which can be operated with one hand enables the pilot of a plane to take pictures.

Penguins are dying by thousands along the South African coasts, apparently from some epidemic disease.

Models Help Engineers

Engineering

Engineers will have more freedom in the creation of economical and beautiful forms of construction as a result of a method of design using elastic models, reported by Prof. George E. Beggs of Princeton to the National Academy of Sciences.

Continuous girders and trusses of buildings, arches, arch dams, tunnels, suspension bridges and other such structures are what engineers call "statistically indeterminate" and can not be designed with the use of the simple formulae that serve for simpler structures of more conventional type. Elaborate mathematical methods have been developed for such indeterminate structures, but even these methods are often inadequate and impractical.

With a view to eliminating tedious calculations, Prof. Beggs has made transparent models in which the stresses and strains are shown by the motion of the various portions of the models measured under the microscope. In this way a large structure can be built in miniature and its safety of construction can be determined with assurance and without the necessity of long and intricate computations. Prof. Beggs also reported that he is able to predict the nature of the structural action within hitherto unknown kinds of construction.

Science News-Letter, November 23, 1929

Pioneer of Wave Mechanics Honored

Physics

One of the modern Alices in the wonderland of the lower physics, Duc de Broglie, scientific scion of a proud French family and member of the French Academy by scientific right as he is royalist by inheritance, is wearer of the Nobel laurels for physics for 1929.

In this high award, physicists see a compliment to a new way of looking at the phenomena of light, electricity and other stuff of which the universe is made. For Duc de Broglie was the pioneer in the development of that most modern branch of physics "wave mechanics", which the German physicist, Schroedinger, developed to an even greater extent.

The theory of wave mechanics as propounded by de Broglie and Schroedinger makes the differences between water and radiation a shadowy borderland. An electron, the unit of electricity and the smallest particle of matter, becomes a sort of manifestation of a group of waves, while waves of light or other radiation at times take on the properties of particles. And then at other times matter is best explained as acting like waves of radiation.

All this is disconcerting to those who learned about light, X-rays, and other radiations some years ago when they were considered wave motions. Despite the new wave mechanics, the classical wave theory of radiation accounts for ordinary optical phenomena with satisfaction and for practical purposes it is not thrown overboard. Yet wave mechanics explains some mysteries unsolved by earlier conceptions and therefore the physicist is in the position of having more than one fundamental law. He uses the one that fits best, confident in the hope that future progress will destroy their apparent inconsistencies.

One daring prediction made by Duc de Broglie when he first developed his wave mechanics a few years ago was fulfilled by the discovery of the American physicists, C. J. Davisson and L. H. Germer, that electrons, particles of matter, act like waves in the same sense that light and X-rays are waves.

Science News-Letter, November 23, 1929

Prize for Sugar Studies

Chemistry

Studies of yeasts, sugars and the fermentation of sugars, carried on over many years, won the 1929 Nobel Prize in chemistry for Dr. Arthur Harden and Prof. Hans von Euler.

Dr. Harden, professor of biochemistry in London University and head of the biochemistry department at Lister Institute, has published a book on alcoholic fermentation, besides reports of his many chemical studies, some of which were in the field of vitamins.

Professor von Euler is director of the new biochemical institute of the Stockholm High School, which is really a university, where he has been professor of chemistry for some years. Like Dr. Harden, Professor von Euler has made studies of vitamins also, although his main interest has been in the field of enzymes and sugars. He has published two books on the chemistry of enzymes, besides hundreds of reports of studies conducted alone and in collaboration with others.

The studies of Dr. Harden and Professor von Euler have not heretofore attracted wide attention in this country. They are reported to have found laws which seem to cover the actions of enzymes or catalysts.

Science News-Letter, November 23, 1929

Prize for Thermionics

Physics

The man who discovered the fundamental laws connecting the production of electricity from a hot wire with the temperature of the wire, a phenomenon utilized today by every tube radio set, received the 1928 Nobel prize, just awarded this year. He is Prof. Owen Willams Richardson, director of research in King's College, London, who from 1906 to 1913 was professor of physics at Princeton University in this country.

He is considered father of the branch of physics which he christened "thermionics," which deals with the effect that heat has on matter in generating electrically charged particles, called ions or electrons. While Prof. Richardson's work for which he has received the Nobel prize was done in the interests of the pure advancement of knowledge, his laws find intense practical application in the design of electron tubes now so widely used in radio, the talkies and other applications of physics to industry.

Science News-Letter, November 23, 1929

The first European stood on the brink of the Grand Canyon of the Colorado River eighty years before the Pilgrims landed at Plymouth Rock.

Fire Prevention Is Farm Relief

Chemistry

Solving the problem of spontaneous combustion will be an important contribution by science to farm relief, R. W. Dunlap, Assistant Secretary of Agriculture, pointed out to the Conference on Spontaneous Ignition and Heating of Agricultural and Industrial Products.

Spontaneous combustion in barns and storage bins and haystacks costs the farmers of this country $30,000,000 a year by estimate, yet little attention has been paid to this loss, he said.

"I do not recall an instance during the past eight years, when volumes have been printed concerning farm relief, in which this matter has even been mentioned as a means of helping the farmer," he added. "It is through this avenue and many other similar avenues that full relief will be obtained, and it is high time that our scientists were being supported financially and otherwise in solving this problem which is so costly to the American farmer.

"The Department of Agriculture has been doing some work along this line for many years, but the financial support it has received has not been sufficient to enable it to make much headway. It is hoped that more funds can be provided so that this important work can go forward more rapidly."

The only way to find out how to store agricultural products so that they will be least liable to destruction and damage by spontaneous ignition is for scientists to learn the exact nature of the chemical processes which take place in masses of materials that heat spontaneously, the Assistant Secretary stated.

The strange phenomenon of hay racks catching fire through no human agency was recognized as a natural process by wise men of old Rome, and yet two thousand years later the process is still as baffling and inexplicable to modern science as it was to Columella and Pliny. Citing the knowledge of ancient observers regarding spontaneous combustion, Dr. Henry G. Knight, chief of the U. S. Bureau of Chemistry and Soils, outlined a program of scientific research which would solve the mystery and enable mankind to forestall the destructive process.

"There is evident need of careful investigation of the exact conditions that produce the spontaneous ignition of agricultural materials as the basis for our future course of action," he stated.

"It will require a cooperative investigation by chemists, bacteriologists, and engineers upon quantities of materials sufficiently large to duplicate actual farm conditions."

Outlining the points requiring special attention, he said:

"Chemical analyses should be made of the fresh material and the chemical changes which take place throughout the heating period should be noted carefully. The rate of heating in different parts of the mass should be determined. The avidity for oxygen of the fresh and fermented material should be studied. The migration of moisture throughout different parts of the experimental material should be carefully observed. The production of gases and their character should receive study. The effects of aeration at various stages of storage should be recorded. Studies of conditions existing in the areas of high heats should be carried on, and the various methods of curing in the case of hay and the effects of adding other substances such as salt to hay and to cattle feed should receive special study.

"Along with this work and based upon it should be studies of methods directed at the reduction of spontaneous heating and actual firing of agricultural materials."

Spontaneous ignition costs American farmers millions of dollars a year, and the chief products which go up in smoke or are spoiled for use by this cause are hay, grain, and horse manure, the chemist stated.

Science News-Letter, November 23, 1929

Lichens as Tree Enemies

Forestry

Reindeer moss, the crisp and curly lichen that is the chief dependence of reindeer in the far North, is an enemy of forest growth farther south, reports Anne E. Allen of Cincinnati, in *Ecology*. This lichen is by no means confined to the lands where reindeer pasture, but grows over great areas, especially as a ground cover under trees, as far south as Florida and Mexico.

It forms dense mats like fine shavings, and the seeds of trees and other plants, caught on top, are held away from the moist earth where they might sprout and grow. They just hang there in the air until they die of drought. Even if they do work their way down to the earth and sprout, their troubles are not necessarily over. The reindeer moss heaves and moves about restlessly as it is alternately wetted and dried, and in doing so frequently breaks or uproots seedlings that have pushed their way through its meshes.

Science News-Letter, November 23, 1929

Mind and Body One Function

Biology

The prevalent theory that man's body and his mind, soul, or spirit are two different and distinct things that can be studied independently is attacked by Dr. William E. Ritter, professor emeritus of zoology, and Dr. Edna W. Bailey, of the department of education, both of the University of California, in the *Journal of Philosophy*.

"Almost the whole force of modern culture as reflected in education," Dr. Ritter charges, "tends to shunt knowledge out of the main channel in which it would normally continue. Man's knowledge is in its early stages naively naturalistic, and would become critically naturalistic as the individual develops toward maturity, but for diverting influences."

It is Dr. Ritter's contention that whatever we do and whatever we are, we do and are as living organisms. It is futile to attempt to understand any of our particular activities, such as using our eyes in seeing and our brain in thinking, as if these were independent of our sensory attributes involved in these activities.

"Few paradoxes of human habits are more puzzling to the naturalist," he states, "than is the amount of study mankind may bestow on himself, while neglecting the fact that individuals must be alive in order that there may be other students themselves or men to study. The problem of vision, like all problems concerning ourselves, is inseparable from our nature as living organisms."

The philosopher and the biologist, no less than the physicist, need a theory of relativity, Dr. Ritter believes. An adequate theory of relativity, he states, will have to include quality-quantity as a "continuum" in the essential sense that the Einsteinian theory contains space-time as a "continuum".

Science News-Letter, November 23, 1929

Southwest a Laboratory

Anthropology

Indians of prehistoric America constitute rare material for the laboratories of science, Dr. A. V. Kidder said in a lecture at the Carnegie Institute of Washington.

Dr. Kidder, who directs the archæological activities of the institution, spoke on the oldest known inhabitants of America and their importance to science. Two factors, he said, combine to create an unparalleled opportunity in the Southwest for study of the growth of early human culture. The first is the favorable climate of the Southwest, where shriveled mummy-like bodies of Indians who lived before the time of Christ have been preserved in the dry hot earth. These burials and possessions of the Indians found with them and in their shelters enable archæologists to study the progress of their culture in the greatest detail, Dr. Kidder pointed out.

The other favoring factor is the scarcity of water in the Southwest, which caused the Indian groups to congregate where water supplies were good and to inhabit the same places, generation after generation. Thus the remains of their habitation have accumulated in the soil in successive layers and scientists can use principles of stratigraphy in determining the relative age and the order of development of various groups.

The remains thus preserved are tremendously worth study, he explained, because they reveal the course of progress when human beings succeeded in taming a wild grain to insure a cereal crop. The transitions of the nomadic and farming periods are lost in Egypt and Mesopotamia, Dr. Kidder stated. In the Southwest, where corn was the cereal crop, the earliest farmers, the Basket Makers, grew only a primitive variety. Later, the Cliff Dwellers and Pueblos grew a number of kinds, and improved the crop. The development of farming brought leisure to the people and made home life possible. Building arts could be experimented with, and community life with rites and rules became complex.

Science News-Letter, November 23, 1929

Sleeping potions used to dull pain were well known to the ancient Greeks and to oriental physicians.

Mink is becoming so scarce that a fur corporation has worked out a process for turning Louisiana muskrat into synthetic mink.

American Receives Royal Society Medal

Chemistry—Physics

The Royal Society's highest honor in chemistry, the Davy medal, will be conferred upon Prof. G. N. Lewis of the University of California for his contributions to classical thermodynamics and the theory of chemical valence. Prof. Lewis is a pioneer in the study of atom structure and his researches have allowed chemists to know more precisely what happens when substances come together. The Davy medal was founded by the brother of the famous Sir Humphry Davy and is given annually for the most important discovery of chemistry in Europe, the United States or Canada.

Prof. Max Planck of the University of Berlin, famed as the originator of the quantum theory, has been awarded the Copley medal of the Royal Society for his contributions to theoretical physics.

Another German, Prof. Hans Geiger of Kiel University, whose atom counter is being used in laboratories all over the world, was given the Hughes medal by the Royal Society for the development of methods of counting alpha and beta particles.

The two Royal medals, which have been awarded annually since their establishment by George IV, were awarded Prof. J. E. Littlewood of Cambridge, for his work on mathematical analysis, and Prof. Robert Muir, Glasgow immunologist, for his medical work.

Science News-Letter, November 23, 1929

Insects as Fish Fodder

Ichthyology

The division of fish and game of the California Department of Natural Resources reports a novel method for securing natural food for baby trout, used by J. W. Ricker at the Cold Creek hatchery. An insect trap designed in the form of a funnel-shaped cloth sack, over which was suspended an electric light, was hung near the water and the light left burning the entire night. In this way, using a number of traps, several hundred pounds of insects were collected and fed to the young trout. Mr. Ricker said the captured insects provided splendid food but that this diet should be supplemented by other types of food, as the young trout did not do so well unless their diet was varied.

Science News-Letter, November 23, 1929

We Average One Illness a Year

Public Health

On an average, each person in the country has at least one disabling illness every year, the Committee on the Cost of Medical Care has reported after a survey of various sickness reports compiled by the U. S. Public Health Service and other organizations.

Men have a disabling sickness about once a year, women about twice and children over twice during the school year. Colds, bronchitis, grippe, influenza and pneumonia are oftenest the cause of these disabling illnesses and cause the longest disability. On the same basis of the number of cases and total time lost digestive disorders and diseases also take a high place.

About 130,000,000 cases of disabling illness occur in the United States each year. Adding non-disabling illnesses more than doubles the figure, the committee reported. The 36,000,000 wage-earners in the country lose at least 250,000,000 workdays per year, and the 24,000,000 school children lose 170,000,000 school days per year. These figures account for only one-half of the total population.

"Authorities have stated that there are at all times approximately 700,000 persons with tuberculosis, 10,000 with pernicious anemia and 110,000 addicted to narcotic drugs," the report said. "In any one year there are in the United States over one million cases of malaria. Syphilis and gonorrhea at any one time appear to be causing nearly one person per 100 to place himself under the care of a physician. Over 36,000 cases of smallpox were reported in a recent year. While childbearing is not a disease, it does cause a large amount of disability. In 1928 there were nearly 2,000,000 births in the registration area, many of them followed by complications and a considerable number (a larger proportion than in most civilized countries) by death.

"Hospitals for mental and nervous diseases contain over 350,000 patients, and this figure is far below what the total would be if those not hospitalized were included. Of the children now attending school and college, 'over 960,000 will enter a hospital for mental disease at some period in their lives if present rates for first admissions continue.' These figures include only the more serious mental diseases and take no account of the large numbers with lesser mental disturbances.

"Hospitals other than those for nervous and mental diseases contain, on the average, over 350,000 patients at all times. The total in all hospitals on a single day is about 700,000."

Science News-Letter, November 23, 1929

Test Radioactivity

Medicine

With a market flooded with waters, salves, hair tonics, tissue creams, mouth washes, heating pads and other preparations alleged to have great healing power because of their radioactivity, government chemists are working on suitable means of detecting the presence or absence of radioactive substances in water and drugs.

At the meeting of the Association of Official Agricultural Chemists, J. W. Sale of the U. S. Department of Agriculture reported on one method of testing radioactivity. He recommended further checking of the method by chemists, before official adoption by the association.

The discovery of the curative properties of radioactive substances has resulted, among other things, in the production of solid, semi-solid and liquid preparations which are being sold as possessing sufficient radioactivity to cure all kinds of conditions. A recent government survey of such waters and drugs revealed that their medicinal efficacy was much misrepresented. Action will be taken against shipments of the alleged radioactive products which are falsely or fraudulently misbranded.

Radium and radioactive substances have possibilities of great harm as well as great good, it is declared. Using them indiscriminately without adequate supervision is extremely dangerous.

Science News-Letter, November 23, 1929

Treatment for Colds Should Vary

Medicine

Because colds are not unchanging but have three distinct stages, treatment must be planned for each stage, Dr. Walter A. Wells, professor of otolaryngology at Georgetown University, has advised. Treatment by a physician will do much to relieve the discomfort and shorten the duration of a cold, but not everyone can have medical treatment for all colds. Remedies to apply at home are described by Dr. Wells in his recently published book.

In the first and second stages treatment should be general, not local, so as not to irritate further the tender membranes of the nose. Dr. Wells describes the first stage as the one when there is stuffiness, chilliness and possible fever and general discomfort. In the second stage there is marked secretion of watery acrid material. This changes to a mucous or mucopurulent discharge during the last stage.

Prevention is the best of all home remedies for a cold, Dr. Wells stated, but having once got a cold, the wise thing is to remain indoors in a comfortable, warm room, resting in bed for a day or so if possible. Cold baths, cold showers and strenuous exercise, valuable hardening methods in the intervals between colds, should be stopped while one has a cold.

"Nothing could be farther from the right than the injunction, 'Feed a cold and starve a fever,'" Dr. Wells explained. "A cold is a fever, the inflammation being localized in the respiratory mucous membranes. Overloading the stomach is directly harmful, and meats, gravies, fried stuff and richly spiced food are especially to be avoided."

Plenty of fluids, including milk and fruit juices, are advisable. For the beginning stage of a cold, free perspiration helps and for this hot drinks may be taken.

During the acute, feverish stage of a cold, the blood tends to be less alkaline than usual. To combat this, alkaline treatment, such as taking bicarbonate of soda in water, is advised. Gentle local treatment may be begun in the second stage. Steam inhalations of menthol or menthol and eucalyptus are healing and soothing. For the last stage of a cold, alkaline antiseptic solutions used locally as a douche are in order.

The chlorine treatment of colds Dr. Wells and his associates found was frequently helpful in simple uncomplicated cases when used in the first stage. When tonsils or sinuses were involved this treatment had little effect. Dr. Wells has found no scientific foundation for the now popular vaccine treatment of colds, and attributed the occasional good results from it to coincidence.

Science News-Letter, November 23, 1929

A Folding Husband

Anatomy

"Will the busy and crowded housewife of the future, along with folding beds, folding kitchens and folding baby carriages, have a folding husband to match?"

Thus inquires the *Journal of Heredity*, presenting a report by Dr. Arthur Kelley on a strangely constructed man who can crease himself down the middle and touch his two shoulders together. He is able to perform this feat, quite impossible to ordinary humans, because he has no collar-bone. Neither the usual physical examination methods nor X-ray photographs show a trace of this favorite subject of horseback-riding accidents.

The condition presented by the "folding man" is apparently hereditary, for he reports that his mother had no collar-bone; and his only child, a daughter, is also without one. His only brother, now dead, was normal.

There are drawbacks to being a folding person, however. Dr. Kelley's discovery has defective bones in his head, which leave a soft spot on the top of his cranium and cause a slightly "dished" appearance at the top of his nose, and also make his features rather smaller than they are in most persons. Dr. Kelley reports that his "folding man" is native born, of old American stock.

Science News-Letter, November 23, 1929

Czechoslovakian Prehistory

Archæology

Relics of men who inhabited Czechoslovakia between 3000 B. C. and 300 A. D. have been unearthed by a joint expedition from the University of Pennsylvania Museum and the Peabody Museum of Harvard.

In the course of less than a month's preliminary search, nineteen archaeological sites were uncovered, the director of the expedition, Vladimir J. Fewkes, reports.

His first official statement says: "Results obtained justify a belief that many of the most important problems relating to the antiquity of mankind may be more closely approached, and possibly solved, by extensive excavations in Czechoslovakia."

The preliminary expedition worked only in the province of Bohemia. Three of the sites containing traces of early inhabitants were dated as being of the Eneolithic, or Copper Age, to 2100 B. C. and 1800 B. C. a period just before their discovery of bronze. Three graves of these people were found, and also part of the settlement where the earth still holds quantities of their pottery, bone awls and chisels, stone knives, clay spindle whorls and loom weights used in making textiles.

"A huge house pit with two fireplaces and an unusual ashpit with stone slabs for heating and pebbles for cooking also were found," Mr. Fewkes states. "These latter discoveries are of an unusual character and it is believed that a careful analysis of them will add considerable to our knowledge of the Eneolithic Age."

Eight graves of the Bronze Age, encased in limestone slabs and containing highly contracted skeletons and bronze and pottery objects were among the expedition's discoveries. At these sites, too, were twenty-two urn burials containing cremated remains and accompanied by scores of pottery vessels and metal objects.

Remains of a settlement of the early Iron Age dating between 800 and 500 B. C. revealed several house pits and the impressions and decayed parts of some of the wooden posts that originally supported the house construction.

An urn burial from the Roman period, about the third century A. D., is pronounced representative of the true "Barbaric" or "Teutonic" culture.

The material found is to be divided between the two museums which conducted the expedition.

Science News-Letter, November 23, 1929

Cactus Groves as Indian Orchards

Botany—Ethnology

The giant sahuaro cacti that stand like sentinels in the southern Arizona desert are fruit trees to the Papago Indians. Their red fruits, filled with sweet pulp, figure so largely on the red man's bill of fare that when the sahuaro and wheat harvests chance to be ripe at the same time he will divide his family into two groups so that he may still gather his share of the "figs from thistles."

In a report to the *Journal of Heredity*, Frank A. Thackery and A. R. Leding, of the U. S. Department of Agriculture, tell of the high value set by the Papago on his cactus crop and of the methods he uses in gathering it.

Sahuaro fruits are the best sources of sugar known in the desert country, and the Indian has as much of a sweet tooth as his Caucasian brother. The Papago make use of the fruits mainly in the preparation of a syrup, which they keep in sealed clay jars until they are ready to use it. It will stay good for a year..

When the fruits show by their red color that they are ripe, a large part of the Papago community leave their villages and journey to their campsites in the midst of the sahuaro "forest." The women have charge of gathering the fruit and preparing the syrup. Gathering fuel and hauling water is the men's job, and since water often has to come from a distance of fifteen miles, the squaws are not necessarily getting the worst of the division of labor.

The women knock the ripe fruits off the tops of the giant cacti with long poles made of spliced cactus ribs and armed with a couple of hooks made of thorns. They pick them up off the ground, slit the skins with a swift slash of the thumbnail, and empty the pulp into a basket. It takes a good half-day's work to gather fourteen or fifteen quarts of this pulp.

Back in the camp, the pulp, with a little water added, is simmered over a fire in an earthen pot. The cooked juice is strained away from the pulp, and then boiled again until it is reduced to a syrup. This is poured into earthen jars and sealed shut.

Besides the syrup, the Indians sometimes prepare preserves of the sahuaro pulp. They also dry some of it without cooking, and eat this "as is" or moistened with water during the winter. The seeds left over from the syrup making are either ground into meal or kept for chicken feed.

Science News-Letter, November 23, 1929

Deplores Forcing of Talentless

Psychology

A due regard for facts of heredity will release from the piano stool thousands of children who are now drudging away at forearm and finger movements without the slightest prospect of ever being able to convert their work into anything more than forearm and finger movements, declares Prof. Paul Popenoe, geneticist. At the same time, regard for the facts of heredity will discover plenty of undeveloped talent, from which may be made real musicians.

Tests of musical ability given to all children in many schools, have disclosed the fact that the untalented are now being given musical education in quite as large proportions as the talented, and it is evident that there is a great waste of energy, talent, and money, Prof. Popenoe states in the *Journal of Heredity*.

Much work remains to be done on the inheritance of musical and artistic capacity, he concludes. But various indications point to the fact that artistic talent is inborn, and in general it is inborn because it existed in the ancestry. In support of this argument, the geneticist marshals a parade of the child geniuses of the past who displayed precocious talent almost in babyhood. He also points to the scientific tests which probe an individual's traits that would be likely to aid or hinder success in the arts. Many of these traits depend on physiological conditions, inborn, perhaps inherited. Studies of families in which the artistic strain is evident bolster up the theory that talents are not distributed as freak gifts of nature but are rather the result of a talented ancestry.

Ability in the arts is not to be thought of as a phase of general superior intelligence, he states. The most promising pupils in an art class were found to be only mediocre in intelligence ratings.

Science News-Letter, November 23, 1929

Hailstones three inches in diameter often fall during storms in India.

Length of Life After Marriage

Statistics

"So they were married and lived happily ever after," the old story books had it. It was seldom happy, modern novelists have shown, and the divorce courts have considerably shortened the length. But for those who expect marriage to be terminated only by death, statisticians of the Metropolitan Life Insurance Co. have computed how long the marriage will last. The figures are based on the ages of the husband and wife.

For example, a husband of 30 years and a wife of 25 may be expected to enjoy life together for 30 years and a few months over. The wife of 25 may look forward to 42 more years of life and the husband of 30 may enjoy 37.1 more years. The joint expectation of life for the two, that is, the length of time that they will remain unseparated by death, is 30.4 years. These figures, of course, are an average, based on the life expectation of large numbers of 30 year old husbands and 25 year old wives. Some couples of these ages will live longer and some less than the average expectation. Just what proportion will live longer and what proportion less long has also been determined by the statisticians.

Husbands and wives who do not expect to obtain divorces can find out how long insurance statisticians expect them to live together by referring to the table below:

Present Ages:	*Joint Expectation of Life of Couple:*
Husband 20, wife 20	35.5 years
Husband 20, wife 25	33.8 years
Husband 25, wife 20	33.6 years
Husband 25, wife 25	32.2 years
Husband 25, wife 30	30.7 years
Husband 30, wife 20	31.4 years
Husband 30, wife 25	30.4 years
Husband 30, wife 30	29.1 years
Husband 30, wife 35	27.5 years
Husband 35, wife 25	28.2 years
Husband 35, wife 30	27.3 years
Husband 35, wife 35	26.0 years
Husband 35, wife 40	24.3 years
Husband 40, wife 30	25.1 years
Husband 40, wife 35	24.2 years
Husband 40, wife 40	22.8 years
Husband 40, wife 45	21.1 years
Husband 45, wife 35	21.9 years
Husband 45, wife 40	20.9 years
Husband 45, wife 45	19.6 years
Husband 45, wife 50	17.8 years
Husband 50, wife 40	18.7 years
Husband 50, wife 45	17.7 years
Husband 50, wife 50	16.3 years
Husband 55, wife 45	15.5 years
Husband 55, wife 50	14.6 years
Husband 60, wife 50	12.6 years

Science News-Letter, November 23, 1929

Few Air Deaths

Aviation

Persons who are still a bit squeamish about taking their first airplane ride may be encouraged by the news that they are only taking a chance of one in 4,000 of dying if they ride with a licensed pilot over a scheduled passenger route.

These are the chances figured out by the committee on aviation statistics of the Actuarial Society of America. The committee found that last year only 13 passengers were killed out of 50,000 who were carried in scheduled flights.

The deaths among all federally licensed pilots were 35 per 1,000 for the first six months of the year and 25 per 1,000 during the last six months. The fatality rate during the year was highest among the pilots operating planes over scheduled routes, where it was 45 per 1,000. The mortality for Army and Navy aviators for the last year was at a lower rate than that for commercial pilots, in spite of the fact that stunt and formation flying are required of the officers. The difference in the mortality rates was considered by the committee to be due to a smaller average flying time per officer.

Science News-Letter, November 23, 1929

Girls More Emotional

Psychology

It is a feminine trait to be very angry, very fearful, very disgusted, or very pitying—judging by an experiment at Stanford University in which persons of both sexes rated their own emotional attitudes toward an assortment of situations. Men and boys felt less emotional, or said they did, in all four moods.

The experiment is part of a study of sex differences conducted at the University by Prof. Lewis M. Terman and Dr. Catharine Cox Miles.

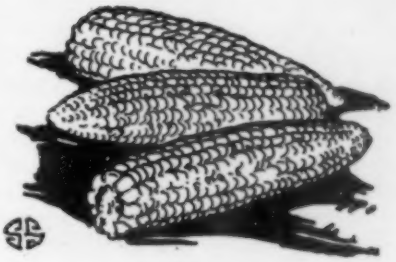
The greatest sex difference is in disgust, the psychologists found. The average woman felt more disgust at situations arousing this emotion than was felt by three-fourths of the men. The least difference between the sexes was shown in cases evoking pity and fear. The most pitying males, Dr. Miles reported, are as emotional as the most pitying females. But there are more groups of males who feel, or say they do, less pity than there are of females.

Older, better educated, and more intelligent individuals of both sexes show a tendency away from excess in all emotions, the psychologists found.

Science News-Letter, November 23, 1929

Nature Ramblings

By Frank Thone



Maize

When the Pilgrims and their Indian friends gathered in the first feast of thanksgiving, over three centuries ago, turkey and venison and fish may have occupied the center of the table; but it was for maize, the Indian corn, that the hearts of the Pilgrims were chiefly thankful, for this grain had been their salvation through that first desperate winter of sickness and starvation. It was a new thing to them, as their letters home showed, but they soon learned, under Indian tutelage, to grow it, dropping a fish or two into each hill to fertilize the soil.

From the small beginnings made at Plymouth, as earlier at Jamestown and the Spanish settlements in Florida, Mexico and the West Indies, the cultivation of this grain, the greatest gift of the Indian to the white man, has grown to its present mighty proportions, wherein its money value is figured in billions, and its importance in our thinking is demonstrated by our calling it merely "corn", which was our Old World fathers' name for all kinds of grain. The bread-grasses our grandsires grew are now ignominiously crowded back under the title of "small grains".

Where this giant grass with the giant ears crowded with the biggest of all grass seeds originally came from is still an unsolved mystery. All the agricultural Indians on the continent had it when the white men came; it must therefore be of at least moderate antiquity. Mummy burials in Peru, Mexico, our own Southwest, have funeral offerings of corn, in several different varieties, and there is abundant evidence that the mound-builders knew the grain too.

Where corn got its more distinctive name of maize is not certain, but it is probable that the word is derived from a Cuban Indian dialect word, "mahiz."

Science News-Letter, November 23, 1929

FIRST GLANCES AT NEW BOOKS

PROCESS AND REALITY—Alfred N. Whitehead—*Macmillan* ($4.50). Prof. Whitehead is well known among scientists who make no pretensions to understanding formal philosophy as one who constantly endeavors to build all authentic knowledge of the external universe into his image of that internal universe which is the mind of man. To such scientists, as well as to professional philosophers, his new book will be an interesting and welcome advent.

Philosophy
Science News-Letter, November 23, 1929

BRAIN MECHANISMS AND INTELLIGENCE—K. S. Lashley—*University of Chicago Press* ($3). A description of Prof. Lashley's quantitative studies on the effect of injuries to the brain. The old idea of specialized brain activities being dependent upon connections between specific neurons along definite anatomical paths is not upheld by his findings. He finds reason to infer that "the mechanisms of integration are to be sought in the dynamic relations among the parts of the nervous system rather than in details of structural differentiation." While his experiments deal with the effect of quantitative brain injuries on the learning process and habit retention in rats, the results appear to be capable of generalization in connection with cerebral functioning in intelligence.

Physiology—Psychology
Science News-Letter, November 23, 1929

THE BEHAVIOR OF YOUNG CHILDREN—*Ethel B. Waring and Marguerite Wilker* ($1). A practical guide book for parents who want to know how to study the behavior of their own young children. The book gives an intensive course in two important situations, sleeping and eating, for the principles which hold good in these situations can be applied generally in child care. Numerous brief examples are cited to show good and bad methods of handling a situation and the reactions of the children to the behavior of the adults.

Psychology
Science News-Letter, November 23, 1929

HENRY FORD, MOTOR GENIUS—William A. Simonds—*Doubleday Doran* ($2). Ford, today a synonym for mass production as well as automobile, is described as man and manufacturer in this biography.

Automotive Engineering
Science News-Letter, November 23, 1929

TWO THOUSAND YEARS OF SCIENCE—R. J. Garvey-Gibson—*Macmillan* ($4). A well-written single-volume history of science, especially from the sixteenth century onward. It might have given better balance, however, if the somewhat meager chapters on the beginnings of science in antiquity and the middle ages had been expanded a little.

History of Science
Science News-Letter, November 23, 1929

NINTH ANNUAL REPORT OF THE SCIENTIFIC AND INDUSTRIAL RESEARCH COUNCIL OF ALBERTA, 1928—*W. D. McLean, Edmonton* (35c.). Devoted largely to fuels, road materials and a summary of the work of the provincial geological survey.

Geology
Science News-Letter, November 23, 1929

MUSEUMS IN SOUTH AMERICA—Laurence Vail Coleman—*American Association of Museums* ($3). All who are interested in museums and their activities will welcome this directory of one hundred South American institutions. Descriptive paragraphs about each institution tell something of its buildings, its outstanding collections and its special projects, its financial system, and its organization. A fine assortment of photographs show the appearance of many of the buildings, plans of exhibition floors, and arrangement of collections.

Museum Science
Science News-Letter, November 23, 1929

LIST OF PSYCHIATRIC CLINICS FOR CHILDREN IN THE UNITED STATES—U. S. Children's Bureau—*Government Printing Office* (10c.). Habit clinics have grown so numerous and there are still so many places where there are none to be found, that a directory is a useful little reference work. Nearly 500 clinics are listed here, with their addresses and hours for consultation.

Psychiatry
Science News-Letter, November 23, 1929

CACTI—David Griffiths and C. H. Thompson—*Government Printing Office* (25c.). This pamphlet, issued as U. S. Department of Agriculture Circular No. 66, is of more than ordinary interest from both botanical and horticultural viewpoints; well illustrated.

Botany
Science News-Letter, November 23, 1929

KEOKUK DAM AND THE FISHERIES OF THE UPPER MISSISSIPPI RIVER—R. E. Coker—*Government Printing Office* (30c.). After a careful study of fish migrations and of the physical problems presented to various species by the great dam, the author concludes that most commercial kinds are not adversely affected, and that some are benefited by its presence. The volume is Bureau of Fisheries Document No. 1063.

Ichthyology
Science News-Letter, November 23, 1929

MOTION PICTURES IN THE CLASSROOM—Ben D. Wood and Frank N. Freeman—*Houghton Mifflin* ($1.80). An extensive experiment in the use of motion pictures in teaching is reported in this book. Through the cooperation of the Eastman Kodak Company and the National Education Association Committee on Visual Education, ten topics in general science and ten topics in geography were taught in twelve cities. Part of the classes investigated were experimental in that the motion pictures were used in the presentation of the subject matter. The other or "control" classes were taught in the conventional manner. Since these are the first extensive controlled experiments on the use of motion pictures in the schoolroom, the results will be of interest to scientists and educators alike.

Education
Science News-Letter, November 23, 1929

POSTURE AND HYGIENE OF THE FEET—Philip Lewin—*Funk and Wagnalls* (30c.). A great deal of information on an important subject, gathered into a very small book. The author, who is a physician, writes not only of the care of healthy feet, but also of flatfoot, sprained ankles, and other foot troubles.

Hygiene
Science News-Letter, November 23, 1929

POISONS: THEIR EFFECTS AND DETENTION—A. Wynter Blyth and Meredith Wynter Blyth—*Griffin* ($10). This is the fifth revised and enlarged edition of a standard work on toxicology. It contains a wealth of valuable material for the analyst, and the text gains great interest from accounts of a number of cases illustrative of various types of poisoning.

Science News-Letter, November 23, 1929